these columns express the relative ability of different sources of light to produce light of a specific wave length; thus, for instance, if a Heffner lamp, which was used by Miss Koettgen as the standard, should at the yellow wave length 590, give the same intensity as the blue sky, then at the wave length 430, the blue sky would give a violet light that is 61.63 times as intense as the violet light of the Heffner lamp at that point of the spectrum. The author used the spectrum photometer invented by Dr. Arthur Koenig, and the table expresses visual results, and may not apply strictly to chemical or thermal results.

Wave length.	Spectrum color.	Blue sky-light.	Overcast sky.	Bright cloud.	Direct sunlight.	
Microms.						
690	Red.	0.21	0.25	0.37	0.31	0.30
670	Orange.	0.30	0.33	0.46	0.36	0.39
650	Orange.	0.40	0.43	0.56	0.45	0.48
630	Yellow.	0.53	0.57	0.69	0.60	0.62
610	Yellow.	0.74	0.76	0.82	0.79	0.80
590	Yellow.	1.00	1.00	1.00	1.00	1.00
570	Yellow.	1.58	1.57	1.56	1.34	1.34
550	Olive.	2.32	2.24	2.14	1.87	1.86
530	Green.	3.49	3.22	2.95	2.54	2.58
510	Green.	5.75	4.82	4.30	3.68	3.63
490	Blue.	9.41	7.39	6.65	5.56	5.48
470	Blue.	18.17	13.34	11.87	8.65	8.79
450	Blue.	33.95	24.53	19.85	....	13.60
430	Violet.	61.63	36.52	30.73	19.18	19.74

ATMOSPHERIC VAPOR.

The relation between the air and the moisture that it contains is very frequently stated incorrectly in elementary text books on physics and in ordinary popular explanations of meteorological phenomena. The error consists essentially in the idea attached to absorption, as in the sentence "a cubic foot of free air at a temperature of 50° will absorb 4.28 grains of aqueous vapor." This reads as though the writer considered the air in the same light as a sponge. Now, a sponge absorbs water by virtue of its own structure, and if the sponge were not in place the water would not leave its former position in order to ascend into the sponge. It is not so with air. The vapor of water ascends into the air by virtue of certain inherent properties of its own to which the air offers a slight resistance; if the air were absent from a cubic foot of space the vapor would still fill that space. The above quotation should, therefore, read as follows: A cubic foot of space, if saturated at a temperature of 50°, will contain 4.28 grains of aqueous vapor.

It takes a little time for aqueous vapor to diffuse into and thoroughly saturate a given cubic foot of space. It takes a little more time if that space already has air in it, but when the space is finally saturated the amount of the vapor is, so far as can be measured, appreciably the same, no matter whether the air is present or not. We must, therefore, speak of the vapor and the air as coexisting side by side, and it is no more proper to speak of the air as having absorbed the vapor than to speak of the vapor as having absorbed the air.

Owing to the mutual resistance of the air and vapor the molecules of the one do not pass through and among those of the other as freely as they pass through empty space. This gives rise to what is called the coefficient of diffusion or the time required for a unit volume of either gas to completely interpenetrate a unit volume of the other. The time required for this mutual interpenetration is also, of course, the time required for the mutual separation after they have been mixed together. As this time is quite appreciable it follows that both the air and the vapor move along together either horizontally, as wind, or vertically, as in the ascending currents that make clouds. Of course, in such a mixture the temperature of the air and the vapor are precisely the same, and we can not warm or cool one without warming or cooling the other.

If by any process the temperature is lowered below the saturating temperature of 50° F. then the cubic foot of space can not contain so much as 4.28 grains of aqueous vapor and the difference, whatever it may be, must be condensed into particles of water, forming haze, fog, clouds, rain, etc. The cooling just referred to is often brought about by the mere act of expansion as the warm moist air rises in the atmosphere. This expansion implies that work has been done in the interior of the mixture of air and vapor. A mass of perfectly dry air or a mass of perfectly pure vapor would cool by expanding just as the mixture does, but at ordinary temperatures the cooling of the dry air will not convert it into liquid air, whereas the cooling of aqueous vapor can easily convert it into liquid water. We have seen it stated that when the air expands it is, in this rarefied condition, not able to absorb so much aqueous vapor as in its former unexpanded or denser condition. But this is a mistake. Rarefied air at ordinary temperatures in the laboratory will hold as much vapor as denser air at the same temperature. The reason why rarefied air on mountain tops does not ordinarily contain as much vapor as the denser air at the base of the mountain is that the mountain air is cooler; it is the temperature and not the pressure that regulates the quantity of moisture in the upper strata of the atmosphere.

THE METEOROLOGICAL USE OF THE TERM "LOCAL."

The adjective "local" in the expressions "local rain," "local storm," "local wind," "local frost," etc., seems to require some special definition, so that the word may be used in a fairly uniform sense by all meteorologists. As preliminary to any attempt at a definition it will be best to collect together a few examples illustrating the wide range of ordinary usage.

The storm of September 6, 1895, in Oklahoma County, Okla., is stated in the Bulletin of the State Weather Service for that month to have been "the heaviest rainfall and thunderstorm of the season; it was purely *local in nature* and extended only over an area of 300 square miles."

A very heavy rain in southeastern Indiana is said to have given rise to "local floods" and destruction of crops over a region about 7 miles in diameter.

A series of "local rains" on the southern coast of Florida covered a region parallel to the coast for 50 miles north and south, and from 1 to 5 miles broad east and west.

A tornado is a "local phenomenon" whose destructive winds are felt at irregular intervals over a region that may, in an extreme case, be a 100 miles long and 1 mile wide, but is more apt to be from 5 to 20 miles long and scarcely ½ of a mile wide.

A "local cloudburst" may occur in a mountain valley and over an area of scarcely ¼ of a square mile.

Is it possible to attach any definite idea to the term local? Judging from the preceding usages a West India hurricane begins as a "local whirl" in mid-Atlantic, grows into an extensive disturbance over the West Indies and our Atlantic coast, becomes a general storm in the North Atlantic, and disappears by merging into the "general circulation of the Northern Hemisphere."

The terms local and general are necessarily indefinite, and are needed for use with that understanding. But in order to give precision to our observations, it is hoped that observers will, when practicable, specify approximately the area in square miles over which any phenomenon is visible rather than content themselves with an indefinite word or usage.

WATER MEASUREMENTS FOR IRRIGATION.

The meteorologist measures the rainfall by the vertical depth of the equivalent layer of water that falls into the mouth of his gauge. Assuming that the catch of his gauge